

# SAGE STEPPE ECOSYSTEM RESTORATION STRATEGY



USDA Forest Service  
Modoc National Forest



Modoc County

USDI Bureau of Land Management  
Alturas Field Office



Prepared with assistance by

**JW** Associates Inc.



## Socio-Economics Specialist Report

January 2008



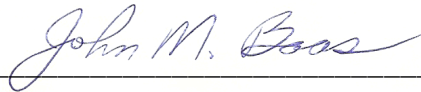


# **Sage Steppe Ecosystem Restoration Environmental Impact Statement**

## **Socio-economics Specialist Report**

**Prepared by:**

John Baas

A handwritten signature in blue ink that reads "John M. Baas". The signature is written in a cursive style and is positioned above a horizontal line.

JW Associates Inc.

**Prepared for:**

USDA Forest Service  
Modoc National Forest

USDI Bureau of Land Management  
Alturas Field Office

Modoc County - California

**January 2008 – JWA V10**

### **Provision**

This document was prepared to support the Sage Steppe Ecosystem Restoration Environmental Impact Statement. Any discrepancies between this document and the Draft and Final Environmental Impact Statements will be resolved by deferring to the Environmental Impact Statements. A memo to the administrative record signed by the technical specialist will document any substantial changes.





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# 1. INTRODUCTION

A consortium of concerned parties have combined to address continuing rapid encroachment of Western Juniper (*Juniperus occidentalis* Hook) on the Sagebrush Steppe and related ecosystems found in the northeastern portion of California and northwestern Nevada. The principal agencies cooperating in this endeavor are the Northeastern California Field Offices for the Bureau of Land Management (BLM) and the Modoc National Forest (MDF) in conjunction with Modoc County and the Modoc County Resource Advisory Committee. In addition, there is participation by approximately 40 other interested groups and agencies at the local, regional, and state level.

The purpose of the Sage Steppe Ecosystem Restoration Project is to restore the distribution of these vegetation types to a location and extent more similar to that which did exist prior to European settlement to benefit sage steppe associated wildlife and other sage steppe ecosystem values. The Analysis Area covers approximately 6.5 million acres located in the counties of Lassen, Modoc, Shasta and Siskiyou Counties in California and Washoe County in Nevada (Figure 1). This report focuses on the conditions of the sage steppe and Western juniper ecosystems that are targeted for restoration. Within the Analysis Area, there is an identified “Focus Area” that contains the sage steppe and Western juniper ecosystems, and includes all areas that are proposed for restoration treatments.

This report focuses on existing information for Siskiyou, Modoc, Shasta, Lassen, and Washoe counties, but primarily on Modoc County. The proportion of lands within the Analysis Area in the other counties is relatively low, compared to Modoc County. For the other counties summary data on demographic characteristics and economic conditions are presented. The exception to this is that detailed information racial and ethnic composition and income of county residents is provided for the entire Analysis Area, to aid in evaluating environmental justice impacts per Executive Order #12898. More detailed information is presented on the grazing and biomass industries in the Land Uses report.

## 1.1 Issues Identified

The issues that have been identified by public scoping that apply to socioeconomics are the following;

**Issue 5:** *Implementation of 30,000 to 50,000 acres of restoration per year with anticipated two years of rest following mechanical or fire treatments and a year of rest prior to prescribed fire treatments may have an adverse economic impact on the local livestock industry. Most suitable grazing land in the Analysis Area is being utilized and therefore livestock have little alternative range to use during rest periods. The project may cause ranchers to reduce their herds or adjust their operations, and result in substantial economic impacts on the local economy.*

**Issue 13:** *The proposed action, with its heavy emphasis on prescribed fire and fire use, has not considered treatment costs and local socio-economics, including opportunities for employment.*

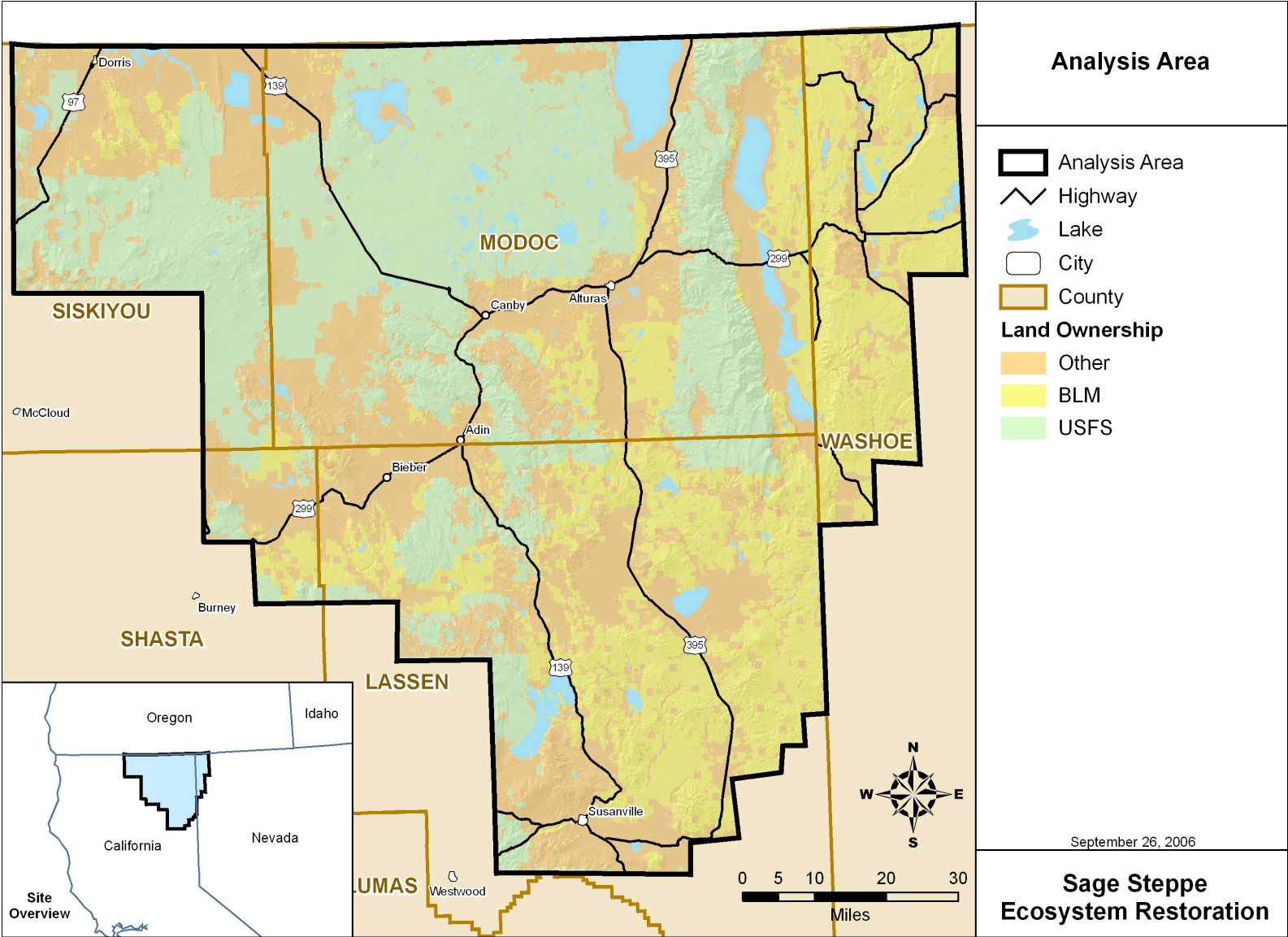


Figure 1. Analysis Area Location Map

## 2. METHODOLOGY FOR ANALYSIS

The CEQ guidelines do not explicitly identify significance criteria to evaluate economic impacts. The following evaluation criteria are based on issues identified during scoping, were evaluated.

1. Agency personnel demand and local ability to meet demand for mechanical restoration and prescribed burning.
2. Changes in local and regional economy, were measured by rested AUMS and the effect on sales, income, and employment.
3. Environmental justice, per USDA guidelines established for Executive Order 12898.

Personnel resources and costs to implement each alternative were estimated based on conversations with Brad Seaburg and Dave Allen (local biomass operators), and Sean Curtis (Modoc County Resource Analyst) regarding the amount of workers and time needed to accomplish the mechanical restoration treatments outlined in the alternatives. Resources needed for prescribed burning were based on conversations with Dave McMasters (Modoc National Forest). Changes in the local economy were estimated using estimated rested AUMs in grazing and inputting these data into IMPLAN. IMPLAN (IMpact PLANning) was developed by the U.S. Forest Service and is used widely by federal and state government agencies and private sector businesses to characterize regional economies and measure economic impacts. Environmental justice was analyzed by examining and comparing the Analysis Area ethnic minority and income data with those for the states of California and Nevada. It was further analyzed by alternative, by determining job opportunities available and potential health risks associated with prescribed burning for each alternative. More detailed descriptions of the IMPLAN modeling and assumptions used in the analysis are presented in Section 4.2.

## 3. EXISTING CONDITION

Economic effects are associated with several of the Significant Issues for this Restoration Strategy. Modoc County has one of the highest poverty rates in northern California, and the Modoc County General Plan (1988) has called for greater economic diversification. Economics is also highly relevant to this Restoration Strategy. Grazing is a foundation of the agriculturally based economy, and grazing income could be reduced by the proposed activities. However, jobs added to accomplish juniper removal could have a positive economic effect.

Data sources used in depicting existing conditions come from a variety of sources for various time periods. Most of the economic and demographic data depict conditions from 1990 to 2004. However, other important sources of data such as the Modoc County General Plan (1988) depict economic activity from earlier time periods (1950 until 1980). As a result of these different data sources, a single range of years was not used for reporting and analyzing data.

The Analysis Area includes portions of Siskiyou, Shasta, Lassen and Washoe Counties, in addition to all of Modoc County. Although the economic impacts of treatments in the counties are similar with respect to acre for acre economic effects, the economic diversity of Siskiyou, Shasta, Lassen and Washoe Counties is greater; therefore the focus of local economics for the Sage Steppe Ecosystem Restoration Strategy will be on Modoc County.

### 3.1 Summary of Historic Socioeconomic Conditions

This section focuses on the social and economic history of European settlers. The Native American economies were integrated with the European settlers soon after they arrived. For a discussion of the social history of the Native American Tribes in the Analysis Area, see JW Associates 2008a.

By 1864, the first permanent European settlement was established by James Townsend in Surprise Valley near what is now the area south of Cedarville. The town of Surprise Valley, later named Cedarville, was established in 1867. In 1870, Presley, Carlos, and Jim Dorris settled the town of Dorris Bridge, later to become the City of Alturas. At about the same time, settlers established homes in the area of modern Adin. Modoc County was officially made a county in 1874, and by 1880 there were about 4,400 people in Modoc County (Pit River Watershed Alliance 2004). The population tended to concentrate in Surprise Valley and along the Pit River. Surprise Valley was, at this time, the most populous area of the county. In addition to Alturas, several towns had been established, including Canby, Eagleville, Likely, Adin, Lake City, and Cedarville. Several lumber mills were operating in the county (Pit River Watershed Alliance 2004).

The predominant economic activity was agriculture (mostly grazing). The timber production business was also an important element of the economy. The period of 1880 to 1910 saw steady expansion of the population (by 1910 the population was about 6,200). The population concentrated in existing town areas. The exception was the High Grade mining district, which saw substantial expansion across the Warner Mountains at the north end of the county, but only for a brief period. Railroad service was established in 1908, four years after electrical service. Some exports occurred, but production was local-service oriented.

World War I had a substantial effect on the local economy and population. Many people left the county and most of the small lumber mills shut down. Following the end of the war, renewed economic activity occurred. Population increased to about 5,400 in 1920 and to 8,000 in 1930. New mills were being built, including the Pickering Lumber Company in western Alturas around 1925. At the time, the Pickering Mill was considered to be the largest of its kind in the world. The Great Depression had a substantial dampening effect on the local economy and the mill was never finished.

By 1940, economic recovery was taking place in Modoc County. There were nine active mills that produced over 107 million board feet of lumber in 1940. One-tenth of the county population (and one-third of all adult males) was employed in the lumber mills. Agriculture was



the other major economic activity in the county, and was dominated by livestock production including sheep, beef cattle, dairy cows, and horses. By 1940, only 42 percent of the population lived in rural areas. An increased export economy created more non-agricultural jobs in the county. Farming operations were changing from subsistence crops to income producing livestock and export crops.

The company-owned lumber camps were all in upland areas, and with the exception of Big Lakes, were all located on the western edge of the Devils Garden. The largest, Tionesta, in 1940, was the second-largest town in the county, with more than 700 residents. The other company lumber towns were Long-Bell Camp Number 1, and Big Lakes, all in reality semi-permanent logging camps. Alturas had almost doubled in size between 1912 and 1940. Growth resulted because of the increasing functions of a county seat and the fact that the town was by far the best retail center in the county. Pavement of the major highways through the county had benefited Alturas in two ways. More retail trade was coming from outlying areas at the expense of the rural market centers, and the beginnings of regional highway traffic through the county permitted Alturas to cater to tourists passing through the scenic volcanic lands. The town had continued to grow on the north side of the North Fork of the Pit River. Main Street was now a part of the U.S. Highway 395, and new stores and service stations were located on this regional thoroughfare north of the old business district.

In 1940, Alturas was described as containing 654 dwellings with no home worth more than \$10,000.00, but with only 32 worth less than \$1,000.00. There were more than 100 retail establishments and shops, adequate high schools and elementary schools, a library, five churches, fraternal halls, theater, three hotels, county hospital, and various government offices. The town had a modern sewer system, waterworks, paved streets, and sidewalks. Gradual expansion of the population and the economy, plus the revival of the transit role in the economy by railroads and regional motorists, had made Alturas the most important town center in Modoc County (Pit River Watershed Alliance 2004).

Modoc County went through a period of economic stagnation from 1950 through 1980. In 1950, there were 3,738 employees in all sectors, and in 1980 there were 2,925 employees (Table 1). Timber harvest steadily decreased during the mid 1990's to the present with a recent increase in volume from biomass production (Table 2). In contrast, agricultural production varied from year to year from 1976 to 1984, but increased overall. The greatest increase in value occurred in 1979 and 1980 (Table 3). According to the Modoc County General Plan (1988) variations in production are related to variations in the value of agricultural products. Production of vegetables has nearly tripled and livestock has doubled.

**Table 1. Total Employment in Modoc County By Major Industry Sectors<sup>1,2</sup>**

Industry sector	1950	1960	1970	1980	1990	2000
Agriculture	1,244	1,015	791	525	806	897
Construction and mining	287	185	179	75	103	n/a
Manufacturing	770	339	257	225	138	n/a
Transportation and public utilities	372	292	210	175	152	180
Wholesale and retail trade	457	508	601	450	710	761
Finance insurance, and real estate	46	57	97	100	140	259
Services	437	544	660	350	759	869
Government	125	184	164	1,025	1,300	1,431
Total employment (All sectors)	3,738	3,184	2,959	2,925	4,108	n/a

<sup>1</sup> Data were obtained from the Center for Economic Development, Chico State University, 2004. Data may not accurately reflect recent changes in federal, state, or hospital employees. Data are not reported for 2001 and 2002 due to missing data for several categories.

<sup>2</sup> Employment is defined by the California Economic Development Department in the following manner, “civilian employment includes all individuals who worked at least one hour for a wage or salary, were self-employed, or were working at least fifteen unpaid hours in a family business or family farm during the week including the twelfth of the month. Those who were on vacation, other kinds of leave, or involved in a labor dispute, were also counted as employed” (Modoc County 2005 Economic and Demographic Profile, page 25).

**Table 2. Timber Harvest on Modoc National Forest<sup>3</sup>**

Year	Annual Harvest (millions of board feet)
1978	92.9
1979	81.5
1980	48.2
1981	54.1
1982	22.6
1983	51.5
1984	42.7
1985	54.2
1986	62.7
1987	74.2
1988	67.6
1989	70.2
1990	58.2
1991	36.2
1992	36.5
1993	37.0
1994	46.8
1995	62.4
1996	58.7
1997	45.1
1998	39.9
1999	14.7
2000	8.3
2001	7.9
2002	8.1
2003	14.7
2004	14.9
2005	16.8
2006	13.2

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<sup>3</sup> Source: Modoc National Forest data for timber harvested per year (Bill Schoeppach 2007)

**Table 3. Gross Value of Agricultural Products in Modoc County (millions of \$)<sup>4</sup>**

Year	Acres	Field Crop \$	Vegetables \$	Livestock \$	Total \$ <sup>1</sup>
1976	486,200	28.07	6.87	10.6	45.6
1977	481,260	21.7	10.0	12.3	43.9
1978	481,850	23.9	10.7	17.2	51.9
1979	482,770	32.3	11.1	24.3	67.6
1980	485,199	39.7	18.2	25.3	83.3
1981	485,939	35.01	19.7	20.5	75.2
1982	482,441	34.0	15.5	19.5	69.0
1983	481,472	37.4	15.7	20.0	73.1
1984	474,674	33.5	21.5	19.1	74.1
2000	n/a	29.0	14.9	12.0	55.9
2001	n/a	26.5	11.0	13.1	50.6
2002	n/a	29.0	26.0	14.5	69.5
2003	444,129	27.4	24.4	16.0	67.8
2004	447,914	31.8	20.9	17.8	70.5

There are substantially fewer agriculture, mining, manufacturing, transportation jobs in 2000 compared to 1950. Government and finance jobs show substantial increases during the same time period. This mirrors an economic structural change that has occurred throughout many rural counties in California. These estimates are taken from a report produced by Chico State University, Center for Economic Development (2004).

### 3.2 Sense of Place

Modoc County has the lowest population density among the California counties in the Analysis Area. It is located several hours drive from other population centers such as Redding, Klamath Falls, and Reno. Modoc County has a sense of place based upon American Indians that have historically occupied and live in the area, and based on a well-developed ranching culture. For example, the Surprise Valley Chamber of Commerce features an annual Basque Barbeque and Squirrel Roundup. Modoc County is also distinct in the amount of undeveloped lands and a slow

<sup>4</sup> Agricultural values do not sum to totals due to rounding.

rate of population growth. Public lands in Modoc County offer abundant opportunities for hunting and viewing wildlife, and for solitary recreation experiences. The Alturas Chamber of Commerce refers to this area, as “*where the West still lives*”, and the Surprise Valley Chamber of Commerce refer to Surprise Valley as an area where “*the pavement ends and the west begins.*” Modoc County is home to several communities that are heavily dependent on resource management activities. For example, there is a biomass plant and sawmill in Bieber, and the Big Valley Sustained Yield Unit legislation was passed to help support communities such as Bieber. The goal of the Sage Steppe Ecosystem Restoration Strategy is consistent with the customs and culture of the Analysis Area.

### 3.3 Current Conditions in Modoc County

Table 4 shows Modoc County population levels from 1990 until 2004. Population of Modoc County has remained nearly constant during the last 15 years, while the population in the city of Alturas has decreased slightly since 1990 (Table 5).

**Table 4. Modoc County Population<sup>5</sup>**

Year	Population	Annual Percent Change	Population density (people/square mile)
1990	9,600	n/a	2.43
1991	9,725	1.3	2.47
1992	9,850	1.3	2.50
1993	9,950	1.0	2.52
1994	10,000	0.5	2.53
1995	10,000	0.0	2.53
1996	9,950	-0.5	2.52
1997	9,975	0.3	2.53
1998	9,825	-1.5	2.49
1999	9,550	-2.8	2.52
2000	9,400	-1.6	2.38
2001	9,400	0.0	2.38
2002	9,350	-0.5	2.37
2003	9,550	2.1	2.42
2004	9,650	1.0	2.45

<sup>5</sup> Source: California Department of Finance, Demographic Research Unit

**Table 5. City of Alturas Population**

Year	Population	Annual Percent Change	Population density (people/square mile)
1990	3,190	n/a	420
1991	3,230	1.3	425
1992	3,240	0.3	426
1993	3,270	0.9	430
1994	3,240	-0.9	426
1995	3,180	-1.9	418
1996	3,120	-1.9	411
1997	3,120	0.0	411
1998	3,060	-1.9	403
1999	2,950	-3.6	388
2000	2,890	-2.0	380
2001	2,860	-1.0	376
2002	2,840	-0.7	374
2003	2,880	1.4	379
2004	2,840	-1.4	374



Table 6 shows age distribution for Modoc County. In the 20 to 39 year old age group, there has been a decrease from about 2,450 persons in 1990 to 1,983 individuals in 2004. It is likely that as youth complete high school and or other forms of training, many leave the area in search of employment. In contrast, the number of persons in the 50 to 59 year old age group has increased by more than 50% since 1990. The increase in the 50-59 year old age group mirrors a regional trend in northern California of retirees migrating from urban areas to rural areas. This is reflected in income data showing that 26 percent of total personal income in Modoc County is from transfer payments (welfare, social security, disability, etc.) which is twice as high as the proportion of transfer payment income for California as a whole.

**Table 6. Age Distribution of Modoc County<sup>6</sup>**

Year	0-19	20-39	40-49	50-59	60-69	70-79	80+
1990	2,809	2,456	1,339	971	1,090	698	314
1991	2,811	2,420	1,409	996	1,059	723	333
1992	2,798	2,461	1,492	1,027	1,063	748	359
1993	2,735	2,438	1,556	1,058	1,046	758	358
1994	2,733	2,430	1,594	1,103	1,038	773	370
1995	2,692	2,363	1,608	1,136	999	798	369
1996	2,678	2,295	1,622	1,178	988	794	360
1997	2,711	2,260	1,598	1,291	999	809	358
1998	2,607	2,085	1,512	1,328	988	775	336
1999	2,568	1,929	1,463	1,350	994	763	329
2000	2,626	1,861	1,419	1,377	1,025	773	394
2001	2,623	1,805	1,414	1,416	1,018	792	430
2002	2,536	1,767	1,406	1,429	1,014	802	446
2003	2,490	1,873	1,387	1,484	1,017	810	480
2004	2,420	1,983	1,372	1,518	1,050	830	502

<sup>6</sup> Source: California Department of Finance, Demographic Research Unit

The majority of the population in Modoc County is Caucasian (approximately 80 percent), followed by Hispanic, and American Indians (Table 7). During the last 15 years the number of Caucasians has decreased by about 10 percent. In contrast the number of Hispanics has increased by about 70% to comprise about 12 percent of the population and the number of Asians in the county has doubled. The rate of increase in the Hispanic population in Modoc County is less than the rate of increase for California as a whole. It is important to note that the percentage increases for minority populations are large in part due to the fact that the population base in 1990 was a low number for both Hispanics and Asians, in comparison to the Caucasian population. The number of Blacks has slightly decreased slightly and the number of American Indians has slightly increased. For California as a whole about 47% of the population is Caucasian, and about 32% are Hispanic. (<http://quickfacts.census.gov/qfd/states/06000.html>).

**Table 7. Modoc County Population by Race/ Ethnicity<sup>7</sup>**

Year	Total	Caucasian	Hispanic	Asian	Black	American Indian
1990	9,677	8,480	707	34	75	381
1991	9,751	8,497	759	36	78	381
1992	9,948	8,593	824	41	85	405
1993	9,949	8,559	859	43	74	414
1994	10,041	8,565	881	82	85	428
1995	9,965	8,439	920	85	81	440
1996	9,915	8,342	961	90	76	446
1997	10,026	8,382	1,012	98	81	453
1998	9,631	7,993	1,023	98	76	441
1999	9,396	7,727	1,047	100	77	445
2000	9,475	7,588	1,129	69	68	388
2001	9,498	7,575	1,157	69	68	388
2002	9,400	7,472	1,148	69	68	395
2003	9,541	7,531	1,206	77	68	405
2004	9,675	7,649	1,206	70	68	415

<sup>7</sup> Source: California Department of Finance, Demographic Research Unit

Table 8 shows unemployment for Modoc County. Unemployment based on people not working who were able, available and actively seeking work between ages of 16 and 65 years old. From 1990 until 2003 unemployment has ranged from 7.6 percent to 13.5 percent. Unemployment was highest in 1993 and lowest in 2002. Unemployment reached its peak during 1993, at a time when the entire state was in a recession. Unemployment in 2002 was 7.6 percent, during which time unemployment for the state of California was 6.7 percent (<http://www.labormarketinfo.edd.ca.gov>).

**Table 8. Modoc County Unemployment<sup>8</sup>**

Year	Number of Persons	Unemployment rate
1990	360	9.6%
1991	480	12.4%
1992	510	12.7%
1993	530	13.5%
1994	510	11.9%
1995	560	13.3%
1996	490	11.9%
1997	450	11.5%
1998	440	11.2%
1999	340	8.5%
2000	330	8.5%
2001	280	6.9%
2002	320	7.6%
2003	370	8.4%

Table 9 shows total personal income for Modoc County. Total personal income is defined by the U.S. Department of Commerce as having five components. Earnings by place of work refer to the total income earned from jobs located in a given county. Dividends, interest, and rent are various types of returns on investments and include payments or royalties received from patents, copyrights, and rights to natural resources. Personal contributions for social insurance are always negative and refer to payments made by the self-employed, and other individuals to programs such as Social Security and Medicare. Adjustments by place of residence are made so that total personal income reveals income by place of residence instead of place of work. This is helpful when analyzing the number of individuals that actually work in a given county, not counting

<sup>8</sup> Source: California Employment Development Department

commuters. A positive resident adjustment indicates people live within the county, but work outside it. A negative residence adjustment indicates people work in the county, but live outside it. Transfer payments are income for work not immediately performed, such as Social Security, Medicare, or Medicaid payments. Among the different components of income, transfer payments showed the greatest percent increase since 1990. This reflects the aging of the County's population, and retirees' income from programs such as social security and disability. In 1990, the total personal income for Modoc County was \$146,940, 000. In 2002, this figure increased to \$223,836,000. In 2002, Modoc County's total personal income ranked 22<sup>nd</sup> (last) among the counties in Northern California.

**Table 9. Components of Total Personal Income, Modoc County (thousands of \$)<sup>9</sup>**

Year	Earnings by place of work	Dividends, interest, and rents	Transfer payments	Personal contributions for social insurance	Adjustment for residence	Total personal income
1990	\$81,946	\$32,617	\$29,685	(\$2,957)	\$5,649	\$146,940
1991	\$77,468	\$33,358	\$33,539	(\$3,119)	\$4,969	\$146,215
1992	\$84,224	\$31,518	\$37,645	(\$3,298)	\$5,465	\$155,554
1993	\$94,608	\$33,058	\$40,350	(\$3,672)	\$5,575	\$169,919
1994	\$95,300	\$32,573	\$41,890	(\$3,963)	\$6,247	\$172,047
1995	\$91,885	\$33,080	\$44,327	(\$4,089)	\$5,856	\$171,059
1996	\$88,713	\$35,241	\$45,549	(\$3,909)	\$5,655	\$171,249
1997	\$96,661	\$38,892	\$45,438	(\$3,758)	\$5,742	\$182,975
1998	\$100,555	\$40,447	\$47,568	(\$3,901)	\$5,050	\$189,719
1999	\$115,611	\$40,330	\$49,152	(\$4,252)	\$5,776	\$206,617
2000	\$110,378	\$42,368	\$49,739	(\$4,427)	\$6,344	\$204,402
2001	\$111,122	\$45,088	\$54,642	(\$11,032)	\$5,063	\$204,883
2002	\$125,980	\$45,628	\$58,746	(\$11,616)	\$5,098	\$223,836

<sup>9</sup> Source: U.S. Department of Commerce, Bureau of Economic Analysis

Table 10 shows per capita income for Modoc County. When compared to the 22 counties comprising northern California, Modoc County ranks 12<sup>th</sup> in per capita income. Real income showed a large increase (about 8 percent) in 1993, and a large decrease in 2000.

**Table 10. Per Capita Income, Modoc County<sup>10</sup>**

Year	Nominal Per Capita Income	Nominal Per capita income (adjusted for inflation)
1990	\$15,641	\$21,529
1991	\$15,501	\$20,475
1992	\$16,119	\$20,669
1993	\$17,958	\$22,357
1994	\$17,919	\$21,752
1995	\$18,095	\$21,360
1996	\$18,034	\$20,678
1997	\$19,135	\$21,448
1998	\$20,480	\$22,603
1999	\$22,594	\$24,398
2000	\$20,802	\$21,732
2001	\$22,009	\$22,357
2002	\$24,053	\$24,053

### *Poverty Rate*

The poverty rate is determined by a set of money income thresholds that vary by family size and composition. In 1989, the Census Bureau ([www.census.gov/hhes/poverty/histpov/hstpov1.html](http://www.census.gov/hhes/poverty/histpov/hstpov1.html)) defined the poverty level for a household of two individuals, regardless of age, as \$8,076 per year, and for 1999 as \$10,865 per year. The average poverty rate in Modoc County in 1999 was 21.5 percent, above the statewide average of 14.2 percent. This was the highest poverty rate among all the northern California counties in 1999 (Center for Economic Development, 2005a), and fifth highest statewide. From 1989 until 1999 the County experienced a 43 percent increase in poverty, while the City of Alturas experienced an increase of 95% (from 13.9% to 27.1%). The high poverty rate combined with an average per capita income for Northern California indicate that there is a larger income disparity in Modoc County than the other 22 counties in this region of California.

<sup>10</sup> Data source is the Chico State University, Center for Economic Development, 2005 Economic and Demographic Profile for Modoc County

### ***Business and Industry***

Table 11 shows employment in Modoc County by industry sectors. Data are from the U.S. Department of Commerce, Bureau of Economic Analysis. For these data, both part time and full time employment are counted equally, sole proprietors are counted, but unpaid family workers are not counted. The sectors are described as follows.

**Agriculture and Mining.** Agriculture includes establishments primarily engaged in agricultural production, forestry, commercial fishing, hunting and trapping and related services. Related services for agriculture could include farm equipment stores. Mining includes companies engaged in the extraction of natural minerals, as well as the operations customarily done at the mine site, such as crushing, screening, washing, and floatation. Since mining is too small to be measured independently it is included as a component of agriculture.

**Construction.** This sector includes businesses engaged in building, modifying, or repairing structures.

**Finance, insurance, and real estate.** This includes institutions, such as banks, credit unions, brokers, and dealers in securities and commodity contracts, insurance agents and brokers, real estate owners, lessees, agents, and developers.

**Government and public administration.** This includes the executive, legislative, judicial, administrative, and regulatory activities of federal, state, and local governments. Businesses owned and operated by a government body are classified in the other nine sectors according to the activity in which they are engaged.

**Manufacturing.** This section includes businesses engaged in the mechanical or chemical transformation of materials into new products. Establishments that assemble parts of manufactured products are also included, as long as the final product is neither a structure nor a fixed improvement.

**Retail Trade.** This sector includes businesses engaged in selling merchandise for personal or household consumption, as well as those businesses that provide services directly related to the sale of those goods. Sporting goods would fit into this sector.

**Services and Tourism.** The services sector includes a wide variety of businesses performing services to individuals, businesses, government, and other organizations, including lodging, repair, amusement, health, legal engineering, education, and membership.

**Tourism.** The North American Industry Classification System (NAICS) does not include an explicit definition of tourism. Typically tourism is a composite of several other sectors, usually including some services employment and income, food and lodging related employment and income, and the recreation/amusement sector.

**Transportation and public utilities.** This sector includes establishments providing freight or passenger transportation, communication services, electricity, gas, water or sanitary services and all establishments of the United States Postal Service.



Table 11. Employment by Industry, Modoc County<sup>11</sup>

Year	Agric. & Mining	Construction	Manu- facturing	Transport. & Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance & Real Estate	Services and Tourism	Gov't
1990	806	103	138	152	114	596	140	759	1,300
1991	844	118	107	142	113	607	133	650	1,298
1992	823	125	113	135	124	583	133	640	1,317
1993	828	147	87	131	166	572	151	661	1,321
1994	802	144	93	148	187	605	194	759	1,347
1995	850	153	n/a	141	169	596	192	779	1,364
1996	826	135	60	153	173	623	202	783	1,340
1997	801	125	105	132	118	597	224	769	1,351
1998	863	n/a	129	123	213	578	240	831	1,396
1999	968	n/a	149	133	203	591	221	836	1,383
2000	897	n/a	n/a	180	186	575	215	869	1,431
2001	701	227	44	Undiscl.	205	395	233	629	1,271
2002	746	Undiscl.	Undiscl.	Undiscl.	241	417	259	588	1,300

<sup>11</sup> both part time and full time employment are counted equally, sole proprietors are counted, but unpaid family workers are not counted

**Wholesale Trade.** This sector includes businesses engaged in selling merchandise to industrial, commercial, institutional, farm, construction contractors, or professional business users, as well as to retailers and other wholesalers.

In Modoc County the government and public administration sector accounted for the largest number of employees (1,300) in 2002, followed by the Agriculture and Mining sector with 746 employees. Earnings by industry in 2002 (Table 12) show a similar pattern with the Government and public administration sector first and the agriculture and mining sector, second. Over the 12-year period for which data are reported, agricultural earnings show some fluctuation in earnings, probably due to variation in crop and beef prices and the costs of production. In all years, the government and public administration sector ranked first in earnings. In most years, agriculture ranked second in earnings. In all years, agriculture ranked at least third in earnings.

Several conclusions can be drawn from Table 12. Only for the government sectors have earnings steadily increased, presumably due to the fact that many government entities usually give regular cost of living wage adjustments to their employees. Earnings in the construction and finance sectors doubled, possibly due to increased demand for new houses generated by retirees and others moving into the County. Earnings in agriculture stayed relatively constant, with a slight increase in real income in between 1990 and 2002.

Taxable sales are reported since they are an indicator of a county's fiscal health, and are indirectly related to economic conditions. Table 13 shows total taxable retail and total taxable sales for Modoc County. Taxable sales do not necessarily reflect business establishments' total gross income, only the proportion that is taxable. Since 1994 taxable retail sales have grown steadily, from about \$35 million dollars to \$45 million dollars in 2003. This growth pattern (28% increase) is less than the growth in taxable sales experienced by the other California counties in the Analysis Area. Growth in taxable sales grew at 71% over a nine-year period for Shasta County, followed by 48 percent for Siskiyou County, followed by 43 percent for Lassen County. When examining taxable sales on a per capita basis Modoc County is fourth (\$4663 per person) relative to the other California counties in the Analysis Area. Shasta County taxable sales on a per capita basis are about three times as high as Modoc County, at \$13,714 per person. Modoc County's fiscal health is lower than the other three counties in California portion of the Analysis Area.

**Table 12. Earnings by Industry, Modoc County (thousands of \$)**

Year	Agric. & Mining	Construction	Manu- facturing	Transport. & Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance & Real Estate	Services and Tourism	Gov't
1990	17,794	2,188	3,027	4,999	1,941	7,477	1,593	8,551	34,376
1991	12,091	2,233	2,307	5,317	2,213	7,592	1,710	7,228	36,763
1992	15,696	2,480	2,378	5,178	2,697	6,968	1,502	7,592	39,719
1993	22,289	2,830	2,444	5,926	3,629	6,849	1,884	8,406	40,306
1994	18,780	2,824	2,797	6,648	4,481	7,298	2,203	9,638	40,631
1995	14,978	2,825	n/a	6,349	4,073	7,558	2,477	10,863	40,050
1996	9,937	2,496	2,047	6,879	3,983	8,350	2,744	11,733	40,544
1997	16,292	2,566	2,035	7,853	2,005	9,015	3,627	11,551	41,717
1998	13,455	n/a	2,380	8,190	3,863	9,300	3,441	12,317	42,433
1999	26,727	n/a	3,368	8,870	4,322	9,629	3,433	13,333	42,733
2000	11,584	n/a	n/a	10,843	3,928	9,675	2,906	14,692	45,853
2001	6,408	5,832	619	Undiscl.	5,609	8,201	4,034	9,204	50,705
2002	17,163	Undiscl.	Undiscl.	Undiscl.	5,770	8,646	3,958	9,475	53,025

**Table 13. Taxable Retail Sales, Modoc County  
(thousands of \$)<sup>12</sup>**

Year	Taxable Retail Sales	Total Taxable Sales
1990	\$36,631	\$57,866
1991	\$34,209	\$54,236
1992	\$34,509	\$58,147
1993	\$34,221	\$64,379
1994	\$34,803	\$60,018
1995	\$35,905	\$79,731
1996	\$35,354	\$60,059
1997	\$35,446	\$61,449
1998	\$35,955	\$62,250
1999	\$38,354	\$61,857
2000	\$41,552	\$75,906
2001	\$42,543	\$77,150
2002	\$44,934	\$74,066
2003	\$45,043	\$74,007

### 3.4 Current Conditions in Other Counties

#### *Lassen County Summary*

The population of Lassen County increased from 1990 to 2004 by from 27,000 to 34,850 people, or about 29 percent. A significant portion the population increase is attributed to construction of the prison in Susanville, which accounts for about 4,000 people. In 2004 the largest age group was the 20-29 year old age group, which represents about 20 percent of the County's population. Since 1990, the number of people between the ages of 50-59 years old increased by 4.4 percent. Approximately 70 percent of Lassen county residents classified themselves as Caucasian in 2004. Hispanics were the next largest group, comprising about 15 percent of the County's population (Table 14). In 2002, the government and public administration sector of the economy represented about 43 percent of the County's employment (5,612 employees), followed by the services sector, at about 20 percent (2,400 employees). Similarly, earnings by industry show that the government and public administration sector accounted for 62 percent of Lassen County earnings in 2002. Between 2001 and 2002 tourism earnings increased 30 percent in Lassen County, as compared to five percent in California as a whole. The poverty rate for Lassen County was 14 percent in 1999, a decrease of about four percentage points since 1989. The per capita income of Lassen

<sup>12</sup> Source: California State Board of Equalization

County was \$19,174 for 2002, which ranks second last in California. The High Desert Prison in Susanville has a negative effect since incarcerated individuals are presumably included in the County population. Total personal income for Lassen County was \$643,788,000 in 2002.

**Table 14. Racial/Ethnic Composition, Lassen County<sup>13</sup>**

Year	Total	Caucasian	Hispanic	Asian	Black	American Indian
1990	27,692	22,015	2,880	293	1,706	798
1991	28,219	22,445	2,929	298	1,723	824
1992	28,390	22,639	2,917	286	1,715	833
1993	28,708	22,946	2,895	287	1,721	859
1994	28,681	22,938	2,882	288	1,700	873
1995	28,873	23,120	2,874	293	1,692	894
1996	32,269	24,431	3,791	409	2,500	1,138
1997	34,014	24,504	4,558	499	3,200	1,253
1998	33,483	24,074	4,505	502	3,137	1,265
1999	33,627	24,143	4,560	505	3,126	1,293
2000	34,039	24,091	4,776	455	3,111	1,003
2001	34,046	24,050	4,792	459	3,108	1,006
2002	34,129	24,060	4,828	460	3,114	1,010
2003	34,633	24,456	4,874	468	3,120	1,047
2004	36,209	25,180	5,334	317	3,435	1,087

### *Siskiyou County Summary*

The population of Siskiyou County increased from 1990 to 2004 from 43,300 to 44,850 people, or about 3.5 percent. Population density was 7.1 persons per square mile. In 2004 the largest age group was the 50-59 year old age group, which represented about 17 percent of the County's population. Since 1990, the number of people between the ages of 50-59 years old increased by about 75 percent. Approximately 82 percent of Siskiyou county residents classified themselves as Caucasian in 2004. Hispanics were the next largest group, comprising about 8 percent of the County's population (Table 15). In 2002, the services sector of the economy represent the largest proportion of the County's employment (5,522 employees), closely followed by the government and public administration sector (4,499 employees). Retail trade and tourism section provided nearly equal amounts employment (2760 and 2,598 employees, respectively). Earnings by industry show a slightly different pattern with the government and public administration sector

<sup>13</sup> Source: California Department of Finance, Demographic Research Unit

showing the highest earnings, closely followed by the services sector, followed by the transportation and public utilities sector. Between 2001 and 2002 tourism earnings increased 10 percent in Siskiyou County, as compared to five percent in California as a whole. The poverty rate for Siskiyou County was 18.6 percent in 1999, an increase of about four percentage points since 1989. The per capita income of Siskiyou County was \$23,874 for 2002, which ranked second last in California. Total personal income, adjusted for inflation for Siskiyou County was \$1,055,973 in 2002.

**Table 15. Racial/Ethnic Composition, Siskiyou County<sup>14</sup>**

Year	Total	Caucasian	Hispanic	Asian	Black	American Indian
1990	43,631	38,315	2,566	358	681	1,711
1991	44,023	38,478	2,660	402	692	1,791
1992	44,254	38,467	2,769	448	693	1,877
1993	44,727	38,711	2,853	491	702	1,970
1994	45,978	38,783	2,967	555	704	2,062
1995	44,978	38,545	3,022	589	695	2,127
1996	44,513	37,969	3,061	626	677	2,180
1997	44,868	38,077	3,164	674	687	2,266
1998	44,418	37,512	3,205	722	657	2,322
1999	44,238	37,153	3,262	760	662	2,401
2000	44,695	37,074	3,543	631	600	1,660
2001	44,403	36,695	3,582	631	605	1,664
2002	44,628	36,785	3,659	633	607	1,681
2003	45,081	37,117	3,741	637	609	1,701
2004	45,198	37,136	3,796	585	611	1,724

### *Shasta County Summary*

The population of Shasta County increased from 1990 to 2004 from 145,300 to 175,700 people, or about 20 percent. Population density was 46.4 persons per square mile. In 2004 the largest age group was the 20-29 year old age group, which represented about 14 percent of the County's population. Since 1990, the number of people between the ages of 20-29 years old increased by about 35 percent. Approximately 83 percent of Shasta county residents classified themselves as Caucasian in 2004. Hispanics were the next largest group, comprising about 11 percent of the County's population, followed by American Indians (Table 16). In 2002, the services sector of

<sup>14</sup> Source: California Department of Finance, Demographic Research Unit

the economy represent the largest proportion of the County's employment (29,634 employees), followed by the government and public administration sector (14,444 employees). Earnings by industry show a similar pattern with the government and public administration sector showing the highest earnings, followed by the services sector. Between 2001 and 2002 tourism earnings increased 12 percent in Shasta County, as compared to five percent in California as a whole. The poverty rate for Shasta County was 15.5 percent in 1999, an increase of about two percentage points since 1989. The per capita income of Shasta County was \$26,532 for 2002, which ranks eighth in the northern California counties. Total personal income, adjusted for inflation for Shasta County was \$4,557,804 in 2002.

**Table 16. Racial/Ethnic Composition, Shasta County<sup>15</sup>**

Year	Total	Caucasian	Hispanic	Asian	Black	American Indian
1990	147,998	134,774	5,756	2,659	1,073	3,736
1991	153,786	139,316	6,251	2,882	1,171	4,166
1992	156,512	141,035	6,649	3,055	1,253	4,520
1993	158,063	141,749	6,954	3,202	1,318	4,840
1994	158,983	141,838	7,298	3,329	1,376	5,142
1995	159,673	141,765	7,578	3,463	1,437	5,430
1996	159,967	141,341	7,848	3,582	1,500	5,696
1997	161,168	141,725	8,159	3,717	1,565	6,002
1998	161,867	141,682	8,455	3,843	1,606	6,281
1999	162,208	141,274	8,747	3,974	1,658	6,555
2000	164,748	142,087	9,355	3,440	1,311	4,426
2001	167,931	143,134	10,115	3,696	1,492	5,171
2002	172,130	144,692	11,031	4,039	1,722	6,129
2003	175,421	145,792	11,852	4,309	1,923	6,974
2004	178,282	146,260	12,749	4,416	2,142	7,902

### *Washoe County, Nevada Summary*

Washoe County borders northeastern California and includes Reno and the surrounding communities. A summary of social and economic characteristics is provided from the 2000 Census (<http://quickfacts.census.gov/qfd/states/32/320311k.html>), so data are not directly comparable to the California data, which is generally more recent and draws from multiple data sources.

<sup>15</sup> Source: California Department of Finance, Demographic Research Unit

In 2005, the total population of Washoe County was estimated at 389,872 people. Almost one-third of the population (31 percent) fell in the 45 to 59 years old category. Population density was 53.5 persons per square mile, in large part due to the population of the Reno-Sparks area. Population density where project activities would occur would be much lower. Eighty-eight percent of the population was Caucasian, and about 19 percent was Hispanic. Unemployment for the County was five percent, and the poverty level in 1999 was about ten percent. In terms of employment by industry sector, the arts, entertainment, and recreation sector accounted for the largest proportion of employment (34,406 employees) at 20 percent. The education, health, and social services sector is second, and accounted for about 16% of employment (27,041 employees). Retail trade was third, accounting for about 12 percent of employment (20,323 employees). The agriculture sector was last, and accounted for 0.8 percent of the County's total employment. The median, per capita income was about \$45,000.

### 3.5 Livestock Ranching and Grazing on Federal Lands

As noted earlier, agriculture has been an important part of the economic base for the counties within the EIS Analysis Area since the late 1800s. Cattle ranching is by far the largest segment of the agriculture sector in each of the four California counties. According to California County Agricultural Commissioners data, livestock sales (cattle and calves, excluding milk products) in Modoc County exceeded \$22.4 million in 2005, with Shasta and Siskiyou counties generating similar receipts. Lassen County had more than \$8.4 million in livestock sales in the same year.<sup>16</sup>

Ranchers within each of these four counties, and the portion of Washoe County, Nevada within the EIS Analysis Area, all rely on federal grazing allotments for an important part of their operations. The allotments provide feed for range cattle during the six month warm season, and for growing out young calves destined for market in the fall or overwintering. During the remaining six months of the year, livestock are generally kept on private lands. The inventory of beef cattle in California and four counties is displayed in Table 17.

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<sup>16</sup> National Agricultural Statistics Services, "2005 County Agricultural Commissioners Data," California Field Office, August 2006.



**Table 17. Beef Cattle Inventory, California and Select Counties,  
January 1, 2003 through 2006  
(1,000 head)<sup>17</sup>**

Year	California	Lassen	Modoc	Shasta	Siskiyou
2003	740	25	42	16	35
2004	720	25	41	16	34
2005	720	27	44	16	33
2006	700	25	46	18	33
Average	720	25	43	16	33

### 3.6 Summary of Existing Conditions

Over a 15-year period for which there are readily available economic and demographic data, there has not been much economic or demographic expansion in the California counties comprising the Analysis Area, particularly in Modoc County. In Modoc County the population over a 15-year period has remained nearly constant. The number of employees in the government and public administration sector remained constant, while the number of employees in the agriculture and mining sector decreased by about 50 employees. Lassen County showed a substantial increase in population (about three percent per year), in large part due to construction of the High Desert Prison. The population of Shasta County grew at the next fastest rate, at an average of about two percent per year. In 1999, poverty levels in the four California counties ranged from 14.1 percent to 21.5 percent, with Modoc County having the highest poverty level, which has implications for analysis of environmental justice. Per capita incomes were similar across Siskiyou, Shasta, and Modoc counties, with Lassen County having the lowest per capita income at \$19,174. Lassen County shows a much lower per capita income due to the number of prison inmates included in the county's population who make little or no income. For all four California counties, the government and public administration industry sector consistently ranks first or second in terms of numbers of employees and in earnings. For Modoc County, agriculture typically has ranked second in earnings and number of employees; this is not the case for the other three counties where retail and service industry sectors play a larger role. In terms of population density, Modoc County had the lowest among the California counties with 2.45 people per square mile, while Shasta County had the highest with 46.4 people per square mile. The implication of these differences in population density are that Modoc County has a "*sense of place*" that is based more in a rural culture and an agriculturally dependent economy than Shasta County.

The Modoc County General Plan (1988) specifically mentioned wildlife related tourism as a possible means of diversifying the local economy. Improving deer habitat and subsequently deer

<sup>17</sup> National Agricultural Statistics Service, "California Agricultural Statistics," California Field Office, various issues.

population levels may help address this desire for increased wildlife related tourism. Historically, deer hunting was a popular activity in Modoc County, drawing many hunters from outside the area. However, deer herds began to decrease, largely due to increasing juniper density and subsequent forage reductions. From 1987 until 1997 the number of deer tags issued for the Modoc County area decreased dramatically because of deer herd population decreases (Loft 1998). In 1997 only 28% of the number of deer tags in 1987 were issued to hunters due to reductions in deer herds. As a result, mule deer hunting related expenditures in Modoc County decreased from about \$5.4 million dollars per year to about \$540,000 per year. During the same time period statewide demand in nature study and wildlife viewing increased (California Department of Parks 2004). All of these factors result in a large disparity between the demand for deer hunting recreation and the supply of those opportunities in Modoc County.

Nature study, including wildlife viewing is one of the few activities monitored by California Department of Parks and Recreation (2004) that has steadily increased since 1987. Also, the 2000 NVUM survey showed that wildlife viewing is a popular activity on the Modoc National Forest. Finally, there is strong interest in diversifying the economy by improving wildlife related recreation.

Washoe County has a different economy structure than the counties in the California portion of the Analysis Area. This is largely due to the fact that Reno and surrounding communities are located in Washoe County. For Washoe County the amusement and recreation industry sector generates the most employment and earnings. Unemployment, as reported in the 2000 Census, was low at five percent, as was the poverty level at about ten percent. A common trend in all counties was a large proportion of the population in the 50 to 59 year old category. This suggests over time that a larger proportion of income will come into the counties as transfer payments, as opposed to earned income. It also suggests that housing and industries that service the needs of the elderly may be in much greater demand in 10-15 years.

### 3.7 Environmental Justice

Executive Order 12898, "*Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*," requires each federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income. To the extent practical and appropriate, Federal agencies shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. Evaluating environmental justice is part of the NEPA process and constitutes the civil rights impact analysis.

The USDA provides direction to its agencies, including the FS, for incorporating environmental justice considerations into their programs and activities in compliance with Executive Order 12898. The following provisions are pertinent to this Restoration Strategy.

USDA agencies are to ensure to the greatest extent practicable, minority and low-income populations do not experience disproportionately high and adverse effects from USDA programs and activities. USDA agencies also should identify and use opportunities to reach out to such populations and promote USDA programs and activities that positively affect their health and environment.

Continual evaluation of the effect of USDA programs and activities on the environment and health of minority and low-income populations is an important component of environmental justice. USDA agencies shall review and revise as necessary agency decision-making processes to ensure incorporation and full consideration the effects that agency decisions may have on minority and low-income populations.

USDA agencies shall, whenever practicable and appropriate, collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fishing, hunting or trapping for subsistence. Agencies shall communicate with the public the risks of these consumption patterns, including publishing guidance reflecting information available concerning methods for evaluating the human health risks association with the consumption of pollutant-bearing fish or wildlife (USDA, Departmental Regulation Number 5600-002, December 15, 1997).

Relative to California, most racial groups are under represented in the California counties comprising the Analysis Area. However, in all four California counties, American Indians are over represented. Statewide, 0.5 percent of Californians are American Indians. In the California counties in the Analysis Area, the proportion of residents that are American Indians range from three to 4.4 percent.

All four California counties are below the poverty line, and Modoc County ranks in the top five most impoverished counties, as measured by individuals below the poverty line.

**Table 18. Comparison of Ethnic and Racial Distributions in the Analysis Area with California and Nevada.<sup>18</sup>**

	Caucasian	Hispanic	Asian	Black	American Indian
Modoc County	79.1%	12.5%	0.7%	0.7%	4.3%
Lassen County	69.5%	14.7%	0.9%	9.5%	3.0%
Shasta County	82.0%	7.1%	2.5%	1.2%	4.4%
Siskiyou County	82.2%	8.4%	1.3%	1.3%	3.8%
California	47.5%	32.4%	10.9%	6.5%	0.5%
Washoe County	88.0%	19.4%	4.9%	2.4%	2.0%
Nevada	82.5%	22.8%	1.4%	7.5%	1.4%

Table 19 summarizes the proportions of county populations living below the poverty line as of 1999. All four California counties are below the poverty line, and Modoc County ranks in the top five most impoverished counties, as measured by individuals below the poverty line.

**Table 19. Comparison of County Populations Living Below the Poverty Level.**

Area	Proportion below poverty level	Rank in California
Modoc County	21.5%	5 <sup>th</sup>
Lassen County	14.0%	33 <sup>rd</sup>
Shasta County	15.4%	27 <sup>th</sup>
Siskiyou County	18.6%	15 <sup>th</sup>
California	10.6%	n/a
Washoe County	10.0%	n/a
Nevada	11.0%	n/a

<sup>18</sup> Totals Do Not Sum To 100%, Since The Mixed Racial Category is not Included Due To Missing Data For Some Counties and Latinos may be double-counted in the Caucasian and Hispanic categories.

## 4. ENVIRONMENTAL CONSEQUENCES

### 4.1 Overview

The Sage Steppe Ecosystem Restoration Strategy proposes to restore portions of the Analysis Area to a sage steppe ecosystem with vegetative mosaics similar to what existed prior to 1880 settlement. There are three different methods that are proposed to achieve this restoration: mechanical restoration, fire use, and hand restoration. The degree to which each of these methods is used varies between alternatives (Table 20).

Mechanical and hand treatments could yield raw material for potential commercial use. The restoration could increase the area of sage steppe habitat retained over time, and reduce the density of Western juniper in the Analysis Area. The restoration could create more diverse vegetative conditions potentially leading to an increase in the sage steppe dependent species populations. The restored areas would be rested from domestic livestock grazing for a minimum of two growing seasons following restoration activities. For prescribed burning, an additional one-year of rest preceding the activities would be generally required to provide the fine fuels necessary to facilitate burn treatments. These rest periods would have an impact to the local livestock industry throughout the life of this strategy.

#### *Mechanical Restoration*

Mechanical restoration involves the use of heavy machinery to physically remove Western juniper from the area being restored. There are many different kinds of mechanical restoration approaches, but they would all achieve similar results on the landscape. The techniques that have previously been employed in the area, and are expected to be used in implementing the alternatives, include the following;

- Feller-buncher machines that operate on tracks would snip off the juniper trees and put them into a chipper that is pulled behind the feller-buncher. After the chip bin is full the chips would be augured into a tractor-trailer for transportation off site.
- Feller-buncher machines on rubber tires would cut the juniper trees and transport them to a landing area or would pile them for skidding to the landing. Rubber tired skidders would then be used to transport the juniper to the landing areas, as needed. At the landings, the juniper trees would be processed into chips and hauled away or limbed and just the boles hauled away, depending on the intended use for the material.
- Trees may be cut and left on ground in their entirety.
- Combinations of the above methods would also be employed depending on the site conditions, availability of machinery, economic conditions, and other factors.

The mechanical methods of restoration could generate slash in quantities that would require treatment. In these cases, the material would be piled and burned to minimize impacts to

sagebrush. Mechanical methods have the benefit of minimal impacts to sagebrush if they are planned and implemented correctly.

**Table 20. Restoration Treatment by Alternative**

	Alternative A	Alternative B	Alternative C	Alternatives D, E and J
<b>Mechanical Restoration<sup>1</sup></b>				
Dense Juniper Areas	32,500 acres	163,700 acres	163,700 acres	163,700 acres
Less Dense Juniper Areas	0 acres	0 acres	0 acres	272,600 acres
Isolated Juniper Areas	16,000 acres	79,000 acres	79,000 acres	79,000 acres
Total Mechanical	48,500 acres	242,700 acres	242,700 acres	515,300 acres
<b>Fire Use<sup>2</sup></b>				
Inside Wildland Urban Interface (WUI)	16,000 acres	80,100 acres	59,200 acres	34,200 acres
Inside WUI deferred	0 acres	0 acres	20,900 acres	13,700 acres
Outside WUI	177,500 acres	891,600 acres	749,100 acres	540,400 acres
Outside WUI deferred	0 acres	0 acres	142,500 acres	108,900 acres
Total Fire Use	193,500 acres	971,700 acres	971,700 acres	697,200 acres
<b>Hand Treatment<sup>3</sup></b>	8,000 acres	39,800 acres	39,800 acres	39,800 acres
<b>Total Treatment Acres</b>	250,000 acres	1,254,200 acres	1,254,200 acres	1,252,300 acres

<sup>1</sup>Mechanical Restoration areas have the following characteristics:

≤30% slope

Dense juniper areas have >20% canopy closure and are ≤1 mile from existing roads

Less dense juniper areas have 6-20% canopy closure and are ≤1 mile from existing roads

Isolated juniper areas have >20% canopy closure and are greater than 1 mile from existing roads

<sup>2</sup>Fire Use Restoration areas have the following characteristics:

≤20% juniper canopy closure

WUI – Wildland Urban Interface areas

Deferred – special wildlife areas that are deferred from fire use for the first 20 years

<sup>3</sup>Hand Treatments areas have the following characteristics:

>20% juniper canopy closure and >30% slope

Hand treatments are associated with resources such as;

Within 100 feet of seasonal drainages

Cultural/Archaeological sites if compatible with values present

Sensitive habitats

### *Fire Use*

Fire use includes both the use of prescribed fire and natural caused fire to achieve restoration objectives. Young Western juniper is not fire-tolerant and therefore, in favorable conditions, fire can be used to remove juniper from a site. Prescribed fire would be used where enough fuel exists to carry a fire, the fire can be managed successfully and conditions are good for achieving restoration objectives of removing juniper from the site. Natural caused wildland fires would be allowed to burn to achieve restoration objectives in areas, and under conditions, where wildland fires can be managed. Following a fire, it is expected that most of the juniper would be dead but would remain standing for up to several decades.

Fire use would also kill sagebrush because, like juniper, it is not fire tolerant. Burned areas also have a greater potential for invasion by non-native plant species than areas restored using mechanical or hand treatment methods. Burned areas would require careful monitoring and control to prevent spread of invasive species.

### *Hand Restoration*

Hand restoration is the most labor intensive method of restoration and would generally be accomplished by crews with chainsaws cutting down juniper. The trees would then be piled for burning or yarded to areas where trucks or skidders can reach them. This method would be used in the most environmentally sensitive areas or in areas where it is not feasible to use fire or mechanical means.

The benefit of hand restoration is that sensitive resources, such as riparian areas, aspen trees, etc. can be treated with beneficial results. The disposal of the juniper trees and associated slash is a challenge for hand restoration because, once cut down, they cannot be moved easily by hand. This material would be piled and burned, or left on site.

## 4.2 Analysis Assumptions

The following assumptions were used to estimate impacts to economics.

1. Mechanical restoration of 20 acres per day would require five people per day on-site, two feller-buncher operators, two skidder operators, and a supervisor. This average is subject to wide variation as a result of the size and shape of the treatment units, the amount of biomass material on-site, topography, and skid distance to the chip truck (Seaburg pers. comm. 2006). In addition to these resources, three chip truck drivers would be needed to haul chips to the biomass plant. The total personnel resource commitment, on-site on a daily basis is eight people (Seaburg pers. comm. 2006).
2. The operating season for mechanical restoration is typically about May 1 through October 31, or 180 days (Seaburg pers. comm. 2006).

3. Local industry reports that on the average, sites have 10 bone dry tons per acre of biomass available for chipping (Seaburg pers. comm. 2006). For this analysis, restoration areas with different densities of juniper and accessibility were adjusted by the factors in Table 66.

**Table 21. Factors Used to Adjust Available Biomass Based upon Juniper Density and Road Access.**

Juniper Category	Adjustment Factor <sup>1</sup>
Dense juniper areas (>20% canopy closure and <1 mile from existing roads)	1.45
Less dense juniper areas (6-20% canopy closure and <1 mile from existing roads)	0.83
Isolated juniper areas (>20% canopy closure and greater than 1 mile from existing roads)	1.14

<sup>1</sup>The Adjustment Factors are multiplied by the number of acres in each category to adjust the values based upon Gedney *et al.* (1999) and Maxwell and Ward (1980).

4. This analysis does not specify the source of labor or whether the labor would come from existing biomass operations or new operations.
5. The average prescribed fire size each agency can accomplish in a single day would be approximately 500 acres (Savage pers. comm. 2006).
6. Each agency has the capability of executing two (2) prescribed fire projects per week. For planning purposes of this analysis, it is assumed that approximately six weeks are available during which burning would occur. Therefore, at a rate of four burns per week, a total of 24 prescribed fires could be accomplished during the available days in the year with the current agency capability. Additional resources would be required to complete more than 24 burns in one year (JW Associates 2008b).
7. There are 20 burn days available in the fall period and 60 days in the spring. However, constraints such as burn day conditions being outside of prescription values, site access in the spring period, only 50 percent of the 80 days are considered available. Therefore, it is assumed there are 40 available days in which BLM and FS could conduct burning activities (JW Associates 2008b).
8. Typical staffing for prescribed burns would be two overhead team bosses, a 13-person firing crew, a 20-person hand crew, and a 5-person engine crew. Specific salaries for temporary employees would depend on the level of experience and FS and BLM funding.

The following are provided only for current information on the biomass industry in the Analysis Area.



1. A biomass plant typically requires about 8,000 bone dry tons of forest residue per megawatt (MW) of power generated for one year. A 25 MW plant, which is a typical size in northern California, would require 200,000 bone dry tons of forest residue per year (Seaburg pers. comm. 2006).
2. Within the Analysis Area, there are currently three biomass plants in operation located near Bieber, Litchfield and Burney.

### *IMPLAN Analytical Approach and Analysis Assumptions*

IMPLAN is an input-output model used to estimate economic effects of resource actions on federal lands. It has been used widely in estimating impacts for programmatic and project level planning projects. The IMPLAN Pro input-output model allows Analysis Area construction from a sub-county, county, state, or United States level. Use of county level data enables an analyst to build models to any spatial scale: single county, multi-county, state, or entire United States. All IMPLAN data files are available from the Ecosystem Management Coordination Planning Analysis Group (PAG) in Ft. Collins, CO.

IMPLAN was used to assess the impact of lost AUMs on the agricultural economy for a three county economic area that includes Modoc County in California, and Lake and Klamath counties in Oregon. This three county area (“Regional Model”) was chosen for analysis following guidelines in the Economic Impact Technical Guide (Alward et al. 2006) published by the IMPLAN group in the USDA Forest Service, Washington office. The user’s guide indicates that the functional economic area (FEA) must be large enough to represent a semi- self-sufficient economy. Stated another way, the FEA should include the area where people, live, work, and shop. For livestock operations in Modoc County there are purchases of farm equipment that are typically made in Lake or Klamath counties (Curtis, personal communication, 2006). Farm equipment is typically included as a “line item” in livestock operations budgets (University of California Cooperative Extension, Lassen County, 1997).

In addition to the Regional Model, a single county IMPLAN model was developed to analyze impacts on Modoc County. Analysis of impacts was conducted with the following assumptions.

1. Direct economic impacts were estimated and applied to the cattle ranching and farm portion of Sector 11 (Agricultural and Mining services).
2. IMPLAN county level data from 2003 (the most recent available) were used, detailing the relationship between cattle ranching operations, sales, and purchases.
3. Cattle inventory and sales data were taken from the National Agricultural Statistics Service database for the years 2003 through 2006. Statewide production and sales records were combined with county inventories to provide an estimate of county level livestock sales under current management. These estimates were validated with County Agricultural Commissioners data on livestock sales for the respective counties.

4. Reductions in public lands AUMs are assumed to lead to a proportional reduction in livestock inventory and sales. Ranchers would not find alternate sources of pasture or feed.
5. Other changes in external variables that affect livestock operation viability such as cost of fuel, cost of winter feed, and selling prices of livestock, were considered fixed for all alternatives.
6. The effects of resting AUMs were not evaluated on possessory interest taxes or US Forest Service revenue sharing.
7. The FS and BLM range programs are assumed to remain unchanged following project implementation. Therefore, any possible economic impact from increased FS or BLM range program salaries or personnel was not evaluated.
8. Beef cattle and sheep operations would be affected by reductions in AUMs due to short-term rest requirements. Other livestock sectors, including dairy operations, would remain unaffected.
9. Contract or temporary labor would be used by federal agencies to complete project activities that require additional labor. No additional permanent full-time employees would be hired by federal agencies.

### 4.3 Regional Impacts on Livestock Industry

The impacts of the alternatives on federal lands grazing and the analysis of the alternatives in the Regional Model are presented in Table 22. Grazing AUMs that would be subject to rest vary from 6,648 under Alternatives B and C to 8,649 under Alternative E in the highest treatment years of each alternative. The rested AUMs associated with Alternative A are considered a baseline from which to compare the alternative effects of Alternatives B through E. Alternative A is current management and therefore the economic effects of this alternative are currently part of the economy.

According to the 2004 crop report for Modoc County, livestock sales in 2004 for beef cattle were approximately \$17.1 million. The rest of AUMs in any year is assumed to reduce sales by an amount proportional to the total AUMs available. There are approximately 180,078 AUMs on FS and BLM lands in Modoc County. Therefore, estimated sales are reduced from about \$631,000 for Alternatives B and C to \$821,000 for Alternative E compared to Current Management.

Employment in the region would be affected by resting AUMs; about 11 jobs would be lost in the short-term under Alternatives B and C, with as many as 15 short-term job losses under Alternative E. Jobs in the ranching industry would be most directly impacted (six to eight jobs, depending upon alternative). Income losses in the region would vary from about \$128,000 to \$167,000 per year. Ranching businesses would be affected by reductions of \$33,000 (Alternatives B and C) to \$43,000 (Alternative E), but the support industry for ranching (feed,

fuel, trucking, veterinarian services, etc.) would experience additional income losses, ranging from \$76,000 to \$99,000 per year.

**Table 22. Changes in Receipts, Annual Employment, and Income from Rest of AUMs Compared to Current Management in the Three-County Region (Modoc, CA, Lake and Klamath, OR).<sup>1</sup>**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
Maximum Rested AUMs in Analysis Area (rested AUMs per year) <sup>2</sup>	6,648	6,648	6,852	8,649	6,852
Average Rested AUMs in Analysis Area (rested AUMs per year) <sup>3</sup>	5,089	4,951	4,583	4,583	4,583
Total Cash Receipts (1000s dollars)	-\$631	-\$631	-\$651	-\$821	-\$651
<b>Employment (jobs)</b>					
Direct	-6	-6	-7	-8	-7
Indirect	-4	-4	-4	-5	-4
Induced	-1	-1	-1	-1	-1
Total employment	-11	-11	-12	-15	-12
<b>Income (1000s dollars)</b>					
Direct	-\$33	-\$33	-\$34	-\$43	-\$34
Indirect	-\$76	-\$76	-\$78	-\$99	-\$78
Induced	-\$20	-\$20	-\$20	-\$26	-\$20
Total Income	-\$128	-\$128	-\$132	-\$167	-\$132

<sup>1</sup>Changes in AUMs are based upon changes from Alternative A (Current Management). The rested AUMs are located within the Analysis Area but the economic impact is evaluated based upon the three-county area (*Section 4.7.1.1 Methodology of Analysis*). Note: Numbers may not sum precisely due to rounding.

<sup>2</sup>Maximum is the largest amount of reduced AUMs in any year of treatment period.

<sup>3</sup>Average is the straight-line average AUM reduction over 50 years, regardless of the actual length of treatment period.

#### **4.3.1 Alternative A – Current Management**

The economic values associated with Alternative A are considered a baseline from which to compare the alternative effects of Alternatives B through E. Alternative A is Current Management and therefore the economic effects of this alternative are currently part of the economy. The economic effects of Alternative A are presented here for context.

Alternative A (Current Management) includes about 1,261 AUMs rested that equals an annual value in cash receipts of about \$120,000 per year. Current value of total labor income is

estimated to be about \$24,000 annually, equaling an estimated loss of one direct job due to the rested AUMs.

#### ***4.3.2 Alternative B - Proposed Action***

For Alternative B, a maximum of 6,648 AUMs would need to be rested annually over the 2.3 million acres of livestock grazing allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term (two to three years) for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Alternative B would result in an annual reduction in cash receipts of about \$631,000 per year (Table 21), as compared to Current Management. About six direct jobs would be lost due to the rested AUMs. Loss of direct labor income would be about \$33,000 (Table 22).

#### ***4.3.3 Alternative C***

For Alternative C, a maximum of 6,648 AUMs would need to be rested annually over the 2.3 million acres of livestock grazing allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term (two to three years) for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Alternative C would result in an annual reduction in cash receipts of about \$631,000 per year (Table 21), as compared to Current Management. About six direct jobs would be lost due to the rested AUMs. Loss of direct labor income would be about \$33,000 (Table 21).

#### ***4.3.4 Alternative D***

For Alternative D, a maximum of 6,852 AUMs would need to be rested annually over the 2.3 million acres of livestock grazing allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term (two to three years) for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Alternative D would result in an annual reduction in cash receipts of about \$651,000 per year (Table 21), as compared to Current Management. About seven direct jobs would be lost due to the rested AUMs. Loss of direct labor income would be about \$34,000 (Table 21).

#### ***4.3.5 Alternative E***

For Alternative E, a maximum of 8,649 AUMs would need to be rested annually over the 2.3 million acres of livestock grazing allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with

reduced herd size. These impacts would be short-term (two to three years) for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Alternative E would result in an annual reduction in cash receipts of about \$821,000 per year (Table 21), as compared to Current Management. About eight direct jobs would be lost due to the rested AUMs. Loss of direct labor income would be about \$43,000 (Table 21).

#### ***4.3.6 Alternative J (Preferred Alternative)***

For Alternative J (Preferred Alternative), a maximum of 6,852 AUMs would need to be rested annually over the 2.3 million acres of livestock grazing allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term (two to three years) for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Alternative J (Preferred Alternative) would result in an annual reduction in cash receipts of about \$651,000 per year (Table 21), as compared to Current Management. About seven direct jobs would be lost due to the rested AUMs. Loss of direct labor income would be about \$34,000 (Table 21).

#### ***4.3.7 Cumulative Effects on Regional Economy***

The regional economy accumulates all of the economic factors, including this Restoration Strategy. The economic impacts would be most dramatic for individual permittees that are forced to reduce their herds for two to three years. However, the cumulative effects of increased juniper density have included reductions in AUMs for some of the same permittees (JW Associates 2008c). If the restoration does not occur then continued density increases could produce further reductions in AUMs that would not be temporary. If permittees are forced out of business by reductions in AUMs long-term, that would have a more dramatic economic impact than short-term impacts associated with a more positive range condition trend.

### **4.4 Effects on Local Economics**

Local economics impacts were evaluated using the demand on US Forest Service and BLM personnel for prescribed fire implementation and the local ability to meet demand for mechanical restoration. Resources needed to accomplish the mechanical restoration treatments proposed in the alternatives were estimated based on conversations with Brad Seaburg and Dave Allen (local biomass operators), and Sean Curtis (Modoc County Resource Analyst) regarding the amount of workers and time needed. Resources needed to accomplish the prescribed burning treatments proposed in the alternatives were based on conversations with Dave McMasters (Modoc National Forest).

In addition to the demand for local resources, the local impacts from rested AUMs were evaluated for Modoc County. A single county IMPLAN model was developed to analyze impacts on Modoc County from rested AUMs. The regional economic effects on the livestock industry are evaluated above in Section 4.3 Livestock Industry Regional Effects. The region covers Modoc County in California and Lake and Klamath counties in Oregon.

#### ***4.4.1 Alternative A – Current Management***

The economic values associated with Alternative A are considered a baseline from which to compare the alternative effects of Alternatives B through J. Alternative A is Current Management and therefore the economic effects of this alternative are currently part of the economy. The economic effects of Alternative A are presented here for context.

It is estimated that mechanical restoration presently generates more than 3,200 tons of available bone dry tons of biomass per year. Prescribed burning currently consists of an average of eight burns treating about 3,900 acres annually for a total cost of about \$96,000 per year.

Alternative A (Current Management) rests 1,261 AUMs that results in an annual value in cash receipts of about \$96,000 per year in Modoc County. Current loss of total labor income associated with the rested AUMs is estimated to be about \$21,000 annually in Modoc County, resulting in the estimated loss of one direct job.

#### ***4.4.2 Alternative B - Proposed Action***

##### **Direct Effects**

Under Alternative B about 242,700 acres of different density would be subject to mechanical treatment, the largest among alternatives. Alternative B would take 40 years to implement, which would result in the production of an average of 16,300 tons per year. The production of available biomass is estimated at over 655,000 available bone dry tons (Table 23) more than Alternative A (Current Management). Alternative B would require an additional 12-14 seasonal employees to be involved in the on-site portion of mechanical treatment, including several personnel that would drive chip trucks to and from biomass plants (Table 24). Laborers are assumed to be trained forest and conservation technicians; the average annual salary for this occupation in Modoc County in 2006 was \$30,646, for a total cost of \$15,323 per person for six months<sup>19</sup>. Additionally, there would continue to be available forest residue biomass from private sources.

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<sup>19</sup> California Employment Development Department, "Occupational Employment Statistics (OES) Employment and Wages by Occupation," Excel spreadsheet for Northern Mountains Region, July 2006 (accessed at <http://www.labormarketinfo.edd.ca.gov/cgi/career/?PageID=3&SubID=152> on February 19, 2007)

**Table 23. Commercially Available Biomass by Alternative (available bone dry tons)**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
Increase over Alternative A (Current Management) in Decade 1	171,958	69,638	313,369	428,720	140,343
Increase over Alternative A (Current Management) in Decade 2	171,958	171,958	313,369	428,720	313,369
Increase over Alternative A (Current Management) in Decade 3	171,958	171,958	313,369	428,720	313,369
Increase over Alternative A (Current Management) in Decade 4	171,958	171,958	313,369	0	313,369
Increase over Alternative A (Current Management) in Decade 5	0	69,638	0	0	140,343
Increase in biomass produced over the five decades of implementation compared to Alternative A (Current Management) <sup>1</sup>	655,150	655,150	1,220,795	1,220,795	1,220,795
Biomass produced by Alternative A (Current Management)	163,413	163,413	163,413	163,413	163,413
Total Biomass over five decades	818,563	818,563	1,384,208	1,384,208	1,384,208

<sup>1</sup>Alternatives B and D complete restoration at the end of Decade 4, Alternative E completes mechanical restoration at the end of Decade 3 and Alternative J completes mechanical restoration at the end of year 47. Alternative A continues to produce 32,683 tons of biomass per decade. Therefore, the above table shows a smaller increase in biomass produced over the five decades than would be found by adding the total increase for each decade. For example, in Alternative B, total increase in biomass produced from Decade 1 to Decade 4 is 687,833 tons. However, the increase in biomass over the five-decade period is 655,150 tons because Alternative A produces 32,683 tons in Decade 5.

**Table 24. Additional Resources Needed Annually for Mechanical Restoration Compared to Current Management<sup>1</sup>**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
Person days	2,742	2,087	4,223	6,847	3,861
Local workers needed per year (six month period of employment)	12-14	8-12	22	37	19
Labor costs (1000s dollars) <sup>2</sup>	\$230	\$175	\$355	\$575	\$327

<sup>1</sup>Analysis of alternatives assumes workers will work a 6-month season

<sup>2</sup>Costs do not include costs for biological or cultural resource surveys, or costs associated with contract administration if contractor resources are used.

The largest number of acres (971,700) would be restored with prescribed fire under Alternative B (Proposed Action). Alternative B would require an additional 1,640 person days, at a cost of \$492,000 per year for prescribed burning (Table 25). Alternative B would likely require additional labor resources for mechanical treatment and prescribed burning. In particular, the number of burns required to implement this alternative (41 burns) would require additional resources. As the number of burns per year increases, it is likely burning conditions may become more complex requiring more workers per burn than is typical or more numerous burns needed to accomplish the objective of burning 500 acres per day.

**Table 25. Additional Annual Personnel Resources and Costs for Prescribed Burning Compared to Current Management**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
Number of worker days required <sup>1</sup>	1,640	640	1,120	1,400	800
Local workers needed per year <sup>2</sup>	12	5	8	10	6
Labor Costs (1000's dollars) <sup>3</sup>	\$492	\$192	\$336	\$420	\$260

<sup>1</sup>Personnel and costs estimates based on a conversation with Dave McMasters, Modoc National Forest Fire specialist.

<sup>2</sup>Jobs would be temporary, seasonal jobs for the estimated 40 working day duration of the burning program each year.

<sup>3</sup>Costs do not include costs for biological or cultural resource surveys, or costs associated with contract administration if contractor resources are used.

Some of the additional workers required for mechanical restoration and prescribed burning would come from outside Modoc County. These individuals would earn and spend some of their wages in the County, resulting in a long-term, beneficial effect during the 40 years required for project implementation. Regardless of whether employees are added to the economy or come from the existing labor force, there would be indirect, beneficial effects, both short and long-term. These effects include income, and sales generated from expending portions of that income in the region. Employment would likely be generated from the existing labor pool under Alternative B and would help sustain the existing economy.

Over 87,000 acres of grazing allotments would need to be rested annually (Figure 25) over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

In 2002 in Modoc County, the agricultural and mining sector employed 746 employees, which represents multiple industries, including forestry. Under Alternative B, total annual livestock sales for Modoc County would be reduced by \$505,000 compared to Current Management (Alternative A) resulting in a reduction in employment of seven jobs per year, with up to three in the ranching industry (Table 26). Loss of total income from rested AUM in Modoc



County, which would affect other businesses and industries beyond ranchers, would be \$109,000 per year. In the context of the current economy in Modoc County, seven employees represents about one percent of the total employees in the agriculture and mining industry sector, or fewer than three percent of livestock operations jobs (primary and secondary).

**Table 26. Changes in Receipts, Annual Employment, and Income  
as a Result of Rest of AUMs  
Compared to Current Management in Modoc County.<sup>1</sup>**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
Maximum Rested AUMs in Modoc County (rested AUMs per year) <sup>2</sup>	5,318	5,318	5,481	6,919	5,481
Average Rested AUMs in Modoc County (rested AUMs per year) <sup>3</sup>	4,072	3,961	3,667	3,667	3,667
Total Cash Receipts (1000s dollars)	-\$505	-\$505	-\$521	-\$657	-\$521
<b>Employment (jobs)</b>					
Direct	-3	-3	-3	-4	-3
Indirect	-3	-3	-3	-4	-3
Induced	-1	-1	-1	-1	-1
Total employment	-7	-7	-7	-9	-7
<b>Income (1,000s dollars)</b>					
Direct	-\$19	-19	-\$20	-\$25	-\$20
Indirect	-\$80	-\$80	-\$83	-\$105	-\$83
Induced	-\$10	-\$10	-\$10	-\$12	-\$10
Total Income	-\$109	-\$109	-\$112	-\$142	-\$112

<sup>1</sup>Changes in AUMs are based upon changes from Alternative A (Current Management). The rested AUMs are located within Modoc County. Note: Numbers may not sum precisely due to rounding.

<sup>2</sup>Maximum is the largest amount of reduced AUMs in any year of treatment period.

<sup>3</sup>Average is the straight-line average AUM reduction over 50 years, regardless of the actual length of treatment period.

The largest number of acres (971,700) would be restored with fire use under Alternative B (Proposed Action). Alternative B would require an additional 1,640 person days, at a cost of \$492,000 per year for prescribed burning (Table 25). Alternative B would likely require additional labor resources for mechanical treatment and prescribed burning. In particular, the number of burns required to implement this alternative (41 burns) would require additional resources. As the number of burns per year increases, it is likely burning conditions may become

more complex requiring more workers per burn than is typical or more numerous burns needed to accomplish the objective of burning 500 acres per day.

Some of the additional workers required for mechanical restoration and prescribed burning would come from outside Modoc County. These individuals would earn and spend some of their wages in the County, resulting in a long-term, beneficial effect during the 40 years required for project implementation. Regardless of whether employees are added to the economy or come from the existing labor force, there would be indirect, beneficial effects, both short and long-term. These effects include income, and sales generated from expending portions of that income in the region. Employment would likely be generated from the existing labor pool under Alternative B and would help sustain the existing economy.

Over 87,000 acres of grazing allotments would need to be rested annually over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Some impacts to the livestock industry would occur due to reduced income associated with reduced herd size. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

In 2002 in Modoc County, the agricultural and mining sector employed 746 employees, which represents multiple industries, including forestry. Under Alternative B, total annual livestock sales for Modoc County would be reduced by \$505,000 compared to Current Management (Alternative A) resulting in a reduction in employment of seven jobs per year, with up to three in the ranching industry (Table 26). Loss of total income from rested AUM in Modoc County, which would affect other businesses and industries beyond ranchers, would be \$109,000 per year. In the context of the current economy in Modoc County, seven employees represents about one percent of the total employees in the agriculture and mining industry sector, or fewer than three percent of livestock operations jobs (primary and secondary).

### **Cumulative Effects**

The past, present and future foreseeable effects include forest management throughout the Analysis Area. Forest management would potentially require prescribed fire and mechanical treatments that would add to the positive economic impacts from this project. The details of these projects are not currently known.

The effects of adding mechanical treatments anticipated on private and other federal lands to Alternative B (Proposed Action) would be a positive cumulative effect in terms of local resources required to complete mechanical restoration. The total acres treated would increase by nearly 500,000 acres, increasing the amount of workers needed. Workers may need to come from outside the local area, and at a minimum, a proportion of their incomes would be spent within the local area, therefore benefiting the local economy.

The cumulative effects of the economic impacts of the prescribed burning program would be similar to the direct and indirect effects because proportionally little additional burning would occur on private lands. There would be a positive cumulative effect to the local economy.

During project implementation, AUMs rested would not be available for grazing which would have adverse economic impacts.

#### *4.4.3 Alternative C*

##### **Direct Effects**

Under Alternative C about 242,700 acres of different density would be subject to mechanical treatment, the largest among alternatives. Alternative C would take 50 years to implement, which would result in the production of an average of 30,520 tons per year. The production of available biomass is estimated at over 655,000 bone dry tons (Table 23) more than Alternative A (Current Management). Effects of Alternative C would be of the same type as Alternative B for mechanical treatment, but this alternative would require fewer additional workers, estimated at 8-12 seasonal workers, for project implementation (Table 24). For prescribed burning, there would be an additional 640 person days, at a cost of \$192,000 per year (Table 25). Some of the additional workers required for mechanical restoration and prescribed burning would come from outside Modoc County. These individuals would earn and spend some of their wages in Modoc County, resulting in a long-term, beneficial effect during the 50 years required for project implementation.

The AUMs that would need to be rested annually would vary from over 43,000 to a maximum of 87,000 acres over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Impacts to the livestock industry would occur due to reduced income associated with reduced herd sizes. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Under Alternative C, annual livestock sales in Modoc County would be reduced by \$505,000, as compared to current management (Table 26). Direct employment losses would be three jobs per year and direct labor income would be reduced by \$19,000 (Table 26). Total labor income, which would affect businesses and industries beyond ranchers, would be reduced \$109,000.

##### **Cumulative Effects**

The past, present and future foreseeable effects include forest management throughout the Analysis Area. Forest management would potentially require prescribed fire and mechanical treatments that would add to the positive economic impacts from this project. The details of these projects are not currently known.

The effects of adding mechanical treatments anticipated on private and other federal lands to Alternative C would be a positive cumulative effect in terms of local resources required to complete mechanical restoration. The total acres treated would increase by nearly 500,000 acres, increasing the amount of workers needed. Workers may need to come from outside the local area, and at a minimum, a proportion of their incomes would be spent within the local area, therefore benefiting the local economy.

The cumulative effects of the economic impacts of the prescribed burning program would be similar to the direct and indirect effects because proportionally little additional burning would occur on private lands. There still would be a positive cumulative effect to the local economy.

During project implementation, AUMs rested would not be available for grazing which would have adverse economic impacts.

#### ***4.4.4 Alternative D***

##### **Direct Effects**

Under Alternative D about 515,300 acres of different density would be subject to mechanical treatment, the largest among alternatives. Alternative D would take 40 years to implement, which would result in the production of an average of 30,520 tons per year. The production of available biomass is estimated at over 1.2 million available bone dry tons (Table 23) more than Alternative A (Current Management). Alternative D would require an additional 22 seasonal employees to be involved in the on-site portion of mechanical treatment (Table 24). In the context of the current economy in Modoc County, 22 employees represent about three percent of the total employees in the agriculture and mining industry sector.

Alternative D would require an average of 28 additional days of prescribed fire (Table 25). Averaging personnel requirements and costs across all four decades results in 1,120 person days per year at a cost of \$336,000.

The grazing allotments that would need to be rested annually would vary from over 70,000 to a maximum of 90,000 acres over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Impacts to the livestock industry would occur due to reduced income associated with reduced herd sizes. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Under Alternative D, annual livestock sales would be reduced in Modoc County by \$521,000 (Table 26). Direct income would be reduced by \$20,000, resulting in the loss of three direct jobs. Total income would be reduced by \$112,000 resulting in the loss of seven total jobs (Table 26).

##### **Cumulative Effects**

The past, present and future foreseeable effects include forest management throughout the Analysis Area. Forest management would potentially require prescribed fire and mechanical treatments that would add to the positive economic impacts from this project. The details of these projects are not currently known.

The effects of adding mechanical treatments anticipated on private and other federal lands to Alternative D would be a positive cumulative effect in terms of local resources required to complete mechanical restoration. The total acres treated would increase by nearly 500,000 acres, increasing the amount of workers needed. Workers may need to come from outside the local

area, and at a minimum, a proportion of their incomes would be spent within the local area, therefore benefiting the local economy.

The cumulative effects of the economic impacts of the prescribed burning program would be similar to the direct and indirect effects because proportionally little additional burning would occur on private lands. There still would be a positive cumulative effect to the local economy.

During project implementation, AUMs rested would not be available for grazing which would have adverse economic impacts.

#### ***4.4.5 Alternative E***

##### **Direct Effects**

Under Alternative E about 515,300 acres of different density would be subject to mechanical treatment, the largest among alternatives. Alternative D would take 33 years to implement, which would result in the production of an average of nearly 37,000 tons per year. The production of available biomass is estimated at over 1.2 million available bone dry tons (Table 23) more than Alternative A (Current Management). Alternative E would require an additional 37 seasonal employees to be involved in the on-site portion of mechanical treatment (Table 24). In the context of the current economy in Modoc County, 37 employees represent about five percent of the total employees in the agriculture and mining industry sector. In 2002 in Modoc County, this sector employed 746 employees, representing multiple industries, including forestry.

Alternative E would require an average of 35 additional days of prescribed fire (Table 25). Averaging personnel requirements and costs results in 1,400 person days per year at a cost of \$420,000.

The grazing allotments that would need to be rested annually would vary from over 94,000 to a maximum of 109,000 acres over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Impacts to the livestock industry would occur due to reduced income associated with reduced herd sizes. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Under Alternative E, annual livestock sales in Modoc County would be reduced by \$657,000, (Table 26). Direct income would be reduced by \$25,000, resulting in the loss of four direct jobs. Total income would be reduced by \$142,000 resulting in the loss of nine total jobs (Table 26).

##### **Cumulative Effects**

The past, present and future foreseeable effects include forest management throughout the Analysis Area. Forest management would potentially require prescribed fire and mechanical treatments that would add to the positive economic impacts from this project. The details of these projects are not currently known.

The effects of adding mechanical treatments anticipated on private and other federal lands to Alternative E would be a positive cumulative effect in terms of local resources required to

complete mechanical restoration. The total acres treated would increase by nearly 500,000 acres, increasing the amount of workers needed. Workers may need to come from outside the local area, and at a minimum, a proportion of their incomes would be spent within the local area, therefore benefiting the local economy.

The cumulative effects of the economic impacts of the prescribed burning program would be similar to the direct and indirect effects because proportionally little additional burning would occur on private lands. There still would be a positive cumulative effect to the local economy.

During project implementation, AUMs rested would not be available for grazing which would have adverse economic impacts.

#### ***4.4.6 Alternative J (Preferred Alternative)***

##### **Direct Effects**

Under Alternative J (Preferred Alternative) about 515,300 acres of different density would be subject to mechanical treatment, the largest among alternatives. Alternative J would take 47 years to implement, which would result in the production of an average of nearly 26,000 tons per year. The production of available biomass is estimated at over 1.2 million available bone dry tons (Table 23) more than Alternative A (Current Management). Alternative J (Preferred Alternative) would require an additional 19 seasonal employees to be involved in the on-site portion of mechanical treatment (Table 24). In the context of the current economy in Modoc County, 19 employees represent about three percent of the total employees in the agriculture and mining industry sector.

Alternative J (Preferred Alternative) would require an average of 20 additional days of prescribed fire (Table 25). Averaging personnel requirements and costs across all five decades results in 800 person days per year at a cost of \$260,000.

The grazing allotments that would need to be rested annually would vary from over 35,000 to a maximum of 90,000 acres over the 2.3 million acres of range allotments within the Analysis Area (JW Associates 2008c). Impacts to the livestock industry would occur due to reduced income associated with reduced herd sizes. These impacts would be short-term for individual ranchers but would be an adverse impact to the grazing industry for the duration of the restoration activities.

Under Alternative J (Preferred Alternative), annual livestock sales would be reduced in Modoc County by \$521,000 (Table 26). Direct income would be reduced by \$20,000, resulting in the loss of three direct jobs. Total income would be reduced by \$112,000 resulting in the loss of seven total jobs (Table 26).

##### **Cumulative Effects**

The past, present and future foreseeable effects include forest management throughout the Analysis Area. Forest management would potentially require prescribed fire and mechanical

treatments that would add to the positive economic impacts from this project. The details of these projects are not currently known.

The effects of adding mechanical treatments anticipated on private and other federal lands to Alternative J (Preferred Alternative) would be a positive cumulative effect in terms of local resources required to complete mechanical restoration. The total acres treated would increase by nearly 500,000 acres, increasing the amount of workers needed. Workers may need to come from outside the local area, and at a minimum, a proportion of their incomes would be spent within the local area, therefore benefiting the local economy.

The cumulative effects of the economic impacts of the prescribed burning program would be similar to the direct and indirect effects because proportionally little additional burning would occur on private lands. There still would be a positive cumulative effect to the local economy.

During project implementation, AUMs rested would not be available for grazing which would have adverse economic impacts.

## 4.5 Environmental Justice

Environmental justice is a required analysis per USDA guidelines established for Executive Order 12898. Environmental justice was analyzed by examining and comparing the Analysis Area ethnic minority and income data with those for the states of California and Nevada. It was further analyzed by alternative, by determining job opportunities available and potential health risks associated with prescribed burning and mechanical treatment for each alternative. The civil rights impact analysis resulting in the following statement of impacts.

### 4.5.1 Alternative A

Effects on environmental justice are changes in job opportunities for and smoke related health effects to minority and low-income populations. Alternative A would not require additional personnel resources for prescribed burning and mechanical restoration, locally, or from outside the Analysis Area. As a result, Alternative A would not have a beneficial or an adverse impact on environmental justice based on providing additional income or job opportunities to an area that has disproportionately low income.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be negligible for Alternative A.

### 4.5.2 Alternative B

Alternative B would have a beneficial effect on job opportunities for minorities and low-income individuals in the Analysis Area. Mechanical treatment jobs would be conservation or forestry

technician jobs, and each job would pay an estimated \$15,323 during a six-month period of employment, for an annual payroll of \$230,000, over current management. The prescribed burning jobs would be similar jobs but would be temporary, seasonal jobs for the estimated 40-working day duration of the prescribed burning program each year. The annual payroll for these jobs would be \$492,000.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be moderate for the four decades of implementation of Alternative B.

#### **4.5.3 Alternative C**

Alternative C would have a beneficial effect on job opportunities for minorities and low-income individuals in the Analysis Area. Mechanical treatment jobs would be conservation or forestry technician jobs, and each job would pay an estimated \$15,323 during a six-month period of employment, for an annual payroll of \$175,000, over current management. The prescribed burning jobs would be similar jobs but would be temporary, seasonal jobs for the estimated 40-working day duration of the prescribed burning program each year. The annual payroll for these jobs would be \$192,000.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be slight to low for the first two decades and moderate for the last three decades of implementation of Alternative C.

#### **4.5.4 Alternative D**

Alternative D would require additional labor resources for mechanical treatment and prescribed burning. Therefore, Alternative D would have a beneficial effect on job opportunities for minorities and low-income individuals in the Analysis Area. Mechanical treatment jobs would be conservation or forestry technician jobs, and each job would pay an estimated \$15,323 during a six-month period of employment, for an annual payroll of \$355,000, over current management. The prescribed burning jobs would be similar jobs but would be temporary, seasonal jobs for the estimated 40-working day duration of the prescribed burning program each year. The annual payroll for these jobs would be \$336,000.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The



health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be slight to low for the first two decades and low for the last two decades of implementation of Alternative D.

#### **4.5.5 Alternative E**

Alternative E would require additional labor resources for mechanical treatment and prescribed burning. Therefore, Alternative E would have a beneficial effect on job opportunities for minorities and low-income individuals in the Analysis Area. Mechanical treatment jobs would be conservation or forestry technician jobs, and each job would pay an estimated \$15,323 during a six-month period of employment, for an annual payroll of \$575,000, over current management. The prescribed burning jobs would be similar jobs but would be temporary, seasonal jobs for the estimated 40-working day duration of the prescribed burning program each year. The annual payroll for these jobs would be \$420,000.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be low for the first two decades and moderate for the 3<sup>rd</sup> decade and three years of the 4<sup>th</sup> decade of implementation of Alternative E.

#### **4.5.6 Alternative J (Preferred Alternative)**

Alternative J (Preferred Alternative) would require additional labor resources for mechanical treatment and prescribed burning. Therefore, Alternative J (Preferred Alternative) would have a beneficial effect on job opportunities for minorities and low-income individuals in the Analysis Area. Mechanical treatment jobs would be conservation or forestry technician jobs, and each job would pay an estimated \$15,323 during a six-month period of employment, for an annual payroll of \$327,000, over current management. The prescribed burning jobs would be similar jobs but would be temporary, seasonal jobs for the estimated 40-working day duration of the prescribed burning program each year. The annual payroll for these jobs would be \$260,000.

The prescribed burning would occur throughout the Focus Area and therefore, would not represent a disproportionate air quality health risk on minority or low-income populations. The health risk would be the same as the general population as described in the *Air Quality Specialist Report for the Sage Steppe Ecosystem Restoration Strategy* (JW Associates 2008d). The health risk to minority or low-income populations from the prescribed burning proposed would be slight to low for the first two decades and low for the last three decades of implementation of Alternative J (Preferred Alternative).

## 4.6 Mule Deer Hunting Opportunities

Changes in opportunities for mule deer hunting were evaluated because deer hunting has been an important part of the local economy and has been declining due to reductions in mule deer populations (JW Associates 2008e). Tags are determined by California State Wildlife Commission based upon population levels. Opportunities for mule deer hunting were based on the potential for increasing mule deer populations by alternative.

Under Alternative A (Current Management), mule deer habitat and hunting opportunities in the Analysis Area would decline or remain stable. Without substantial efforts to improve mule deer populations through habitat improvement, deer populations would remain stable, or decline.

Alternatives B, C, D, E and J would restore approximately 1,300,000 acres after 33 to 50 years. If mule deer populations increase as a result of this habitat improvement and increase in forage quality, hunting opportunities for mule deer could increase if the California State Wildlife Commission increases the number of tags.

## 4.7 Summary Comparison of Alternatives

Table 27 shows a comparison of the effects of the alternatives on economics. Alternative E would require the most labor for implementing mechanical treatments and has the potential to result in the most beneficial effects on the regional and local economies. Alternative E has the second highest personnel requirements for implementing prescribed burns. However, Alternative E would have the greatest short-term impact on the livestock sector of the local economy, resulting in an annual loss of nine jobs for the time (two to five years) needed to rest some range allotments. In terms of short-term economic impacts to the livestock sector, Alternatives B and C would have the lowest impacts, followed by Alternatives D and J. For all alternatives, except Alternative A (Current Management), the number of jobs created through mechanical treatment and prescribed fire would offset the job losses from resting AUMs.

**Table 27. Comparison of Alternative Effects on Annual Local Economics Compared to Current Management.**

	Alt. B	Alt. C	Alt. D	Alt. E	Alt. J
<b>Annual Effects due to Mechanical Treatments Compared to Current Management</b>					
Labor required to achieve mechanical treatment (jobs) <sup>20</sup>	12-14 jobs	8-12 jobs	22 jobs	37 jobs	19 jobs
Long-term salary costs for mechanical treatment	\$230,000	\$175,000	\$355,000	\$575,000	\$327,000
<b>Annual Effects due to Prescribed Fire Treatments Compared to Current Management</b>					
Labor required to achieve prescribed burning (jobs) <sup>21</sup>	12 jobs	5 jobs	8 jobs	10 jobs	6 jobs
Annual salary costs for prescribed burning	\$492,000	\$192,000	\$336,000	\$420,000	\$260,000
<b>Annual Effects in Modoc County due to Resting of AUMs<sup>22</sup> Compared to Current Management</b>					
Short-term job loss in ranching and related industries (total employment)	-7 jobs	-7 jobs	-7 jobs	-9 jobs	-7 jobs
Short-term loss in livestock sales	-\$505,000	-\$505,000	-\$521,000	-\$657,000	-\$521,000
<b>Net Annual Effect</b>	<b>\$217,000</b>	<b>-\$138,000</b>	<b>\$170,000</b>	<b>\$338,000</b>	<b>\$66,000</b>

## 4.8 Compliance with the Forest Plan and Other Regulatory Direction

The alternatives would be in compliance with the Modoc, Shasta-Trinity, and Klamath Forest Plans and the BLM Alturas, Eagle Lake and Surprise Resource Management Plans.

<sup>20</sup> Jobs would be conservation or forestry technician jobs, and would pay \$15,323 during a six-month period of employment.

<sup>21</sup> Jobs would be temporary, seasonal jobs for the estimated 40-working day duration of the burning program each year.

<sup>22</sup> Annual effects to the three county area due to resting of AUMs are presented in Table 25.

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PhD. in Forest Resource Management from Oregon State University

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### **Experience**

Dr. John Baas has 16 years of experience in environmental consulting. He has experience with several recent projects completing economic and social impact analysis within rural communities. He has experience with IMPLAN modeling on projects including several for the Forest Service. He also has experience working for the Forest Service on economic issues.

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